NUCLEAR, PLASMA, AND RADIOLOGICAL ENGINEERING: RADIOLICAL, MEDICAL & INSTRUMENTATION APPLICATIONS, BS

for the degree of Bachelor of Science in Nuclear, Plasma, & Radiological Engineering with a concentration in Radiological, Medical & Instrumentation Applications

Nuclear, plasma, and radiological engineering encompasses a broad and diverse but complimentary set of engineering disciplines with a wide variety of applications. The first two years of the NPRE curriculum provides a strong foundation in sciences (physics, mathematics, and chemistry), in engineering (mechanics and thermodynamics), in computer use, and in nuclear energy systems. Most of the technical core and concentration coursework takes place in the third and fourth years of the curriculum. Students choose from among three concentrations: power, safety and the environment; plasma and fusion science and engineering; and radiological, medical and instrumentation applications. Each concentration requires students acquire a depth of understanding of the area but with flexibility to develop advanced technical expertise depending upon the student's specific educational and professional interests. Students demonstrate proficiency in the engineering design process in a senior design capstone course.

The radiological, medical and instrumentation applications concentration encompasses the intersection of radiation technologies, medicine, and security. This area focuses on developing science and engineering techniques that utilize ionizing radiation for biomedical research and healthcare as well as nuclear safeguards and radiation detection for homeland security. Areas of scholarship and research in which students are involved include but are not limited to: biomedical imaging, radiation detection and measurement systems, emerging x-ray imaging techniques, image processing, instrumentation for emission tomography (PET and SPECT), spectroscopy, dosimetry, homeland security, nuclear safeguards, nonproliferation, radiation protection during radiation therapy, big data analytics for radiation sensor networks, health physics, advanced thermal neutron detectors, and isotope identification algorithms. Students confer with their academic advisor on a chosen course set to ensure that a strong program is achieved. Students may select technical electives in the life sciences (chemistry, biology) to apply towards pre-med requirements. Technical electives are chosen from among NPRE courses and courses outside the department in the subfields of biomolecular and biomedical engineering. The program prepares graduates for positions in industry, research laboratories, federal and regulatory agencies, as well for medical programs and further graduate study.

Current Program Educational Objectives (https://npre.illinois.edu/academics/undergraduate/program-educational-objectives/)